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The concept of Modular Audiovisual Multimedia Programing, which is generally applicable to meeting the need for automated mass training, has been implemented in an electronic blueprint reading course for industrial employees. A preliminary study revealed that the average prospective student was 25 to 35 years old, limited to a high school education, and insufficiently skilled in electronic symbols and recognition and locating information on blueprints. The material to be learned was organized in nine instructional modules, then presented through several media. A total of 196 color slides was accompanied by commentary on magnetic tape, and each student was supplied with a kit of support materials, including programed instruction and self-evaluation exercises. The course was found suitable for use in the work area and was then self-administered by groups of from one to twenty individuals. Instructional time averaged about six hours, but the total time involved depended on speed of preparation and the number of sessions used to study the nine modules. Comparison of initial and final test scores indicated a significant transference of the desired skills. Management personnel and most of the students expressed satisfaction with the structure, content, and effectiveness of the course. (RM)

MODULAR AUDIO-VISUAL MULTIMEDIA PROGRAMMING

STUDY REPORT-I ELECTRONIC BLUEPRINT READING

North American Aviation, Inc.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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SID 65-1057

MODULAR AUDIO-VISUAL MULTIMEDIA PROGRAMMING CONCEPT

Study Report 1: Electronic Blueprint Reading

Prepared by

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North American Aviation, Inc.

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AUTOMATED MASS TRAINING APPROACH

Recently North American Aviation faced a requirement to qualify a mass of untrained personnel for aerospace skill assignments. In order to provide a variety of skills training to an increased and decentralized population, amid a changing technology, in a compact response period, a new audio-visual (A/V) communication concept was developed called Modular Audio-Visual Programming. [1]

The author, who developed this concept, has expanded it to increase its efficiency and elasticity. This newest training concept is designated as Modular Audio-Visual Multimedia Programming. It is a part of a series of answers to the problem of automated mass training. [2]

DESCRIPTION

Modular A/V Multimedia Programming is a mobile concept that is accomplished by programming carefully ordered subject information into self-contained "modules" or "elements." A series of these modules or elements comprise the total "program" or "package." In support of the advanced A/V programming processes—such as pre- and post-learning surveys, statements of objectives, and statements of terminal behavior—are multimedia items, i.e., motion picture films, slidefilms, closed-circuit television, simulators, programmed instruction books, and various other paper formats.

Basically, the course material is presented on 35mm slides accompanied by instructions on quarter-inch magnetic tape. Kits of work exercises and support materials for student participation are furnished with each package.

Once produced, the program becomes an on-the-shelf library item. The program may then be used in its entirety, or various elements may be selected for a specific requirement. The A/V equipment required to present the program is loaned to the requesting management along with the slides and tapes. Modular A/V programs may be self-administered, at the students' convenience, and in any convenient location.

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[1] Suchesk, Arthur M. The Concept of Modular Audio-Visual Programming. Presented at the State Conference of the Audio-Visual Education Association of California (28 Jan. 1965).

[2] Technological Change: Its Impact on Industry in Metropolitan Chicago. Corplan Associates of IIT Research Institute, Chicago.

STUDY NEEDS

Modular A/V Multimedia Programming, to be completely successful, must be established by studying the results of economic analyses based on trainee population size, the urgency of need, the recurrence factor, and the degree of difficulty likely to be encountered in presenting a particular subject. All of these factors must be subjected to a tradeoff analysis—considering the investment versus the desired results.

This paper presents a detailed description of the concept in operation.

THE CONCEPT IN OPERATION

The example of Modular A/V Multimedia Programming in preparation and use presented here was obtained from the development of an electronic blueprint reading course.

PRELIMINARY SURVEY

The request for this skills transference course was initially received from a product inspection department, by the Audio-Visual Programming Unit. From some guidelines accompanying the request and as a result of a preliminary survey conducted by the A/V programming specialists, it was evident the members of the working population under study were unable to read blueprints because of failure to recognize symbols, and did not know how to locate information on the blueprints.

The investigation further disclosed a need existed for a standardized training approach. Requesting management strongly indicated that the population to receive this training could not be spared from assigned work areas to travel to a centralized classroom center.

Approval for production of this programming package was given, being based on the matching of results of the needs analysis study and established A/V programming criteria requirements.

PROGRAM RESEARCH AND DEVELOPMENT

With the programming concept defined, the following development sequence was activated:

- Conduct detailed target-population profile study; this includes the number of people, types, location, psychological and sociological habits, school background, average age and time with company, the fog index, and motivation classifications
- Prepare statement of objectives and terminal behavior
- Collect necessary subject matter data
- Sequence subject matter facts into a logical learning order based on the population profile study

Identify "sub-subjects" or "learning blocks" as program segments which later become identified as the elements of the total program

- Break out the key points for each element, in order to develop review and test patterns
- Develop story and transition lines
- Develop skill and drill exercises
- Prepare script, storyboard and preproduction plans
- Test and evaluate program

Target Population Study

In researching the electronic blueprint reading course, it was determined that the average student-to-be was 25 to 35 years old, had been with the company for a period of two and a half years, and had completed high school. Some individuals had a basic knowledge of electronics acquired through lay or service schools. Some had an acquaintance with mathematics, usually obtained in high school or through night courses at junior colleges.

From this profile, the help of the subject specialist assigned from the training department and a line foreman assigned from the requesting department, the programmer, functioning as a media specialist, compiled course objectives and statements of terminal behavior. Principal contribution of the line foreman was the interpretation of current shop practice as opposed to interpretation from pure book theory. His participation also provided the requester direct involvement throughout the program.

Time Evaluation

The subject matter previously had been offered in a conventional classroom situation. This method of instruction had required a total of 24 hours, 3 hours per day for 8 days, for the course presentation. The goal of 8 hours instruction time, with a 300-percent increase in information for the trainee, was set up by the programmer.

Objectives of Course

The course objectives were designed for:

- Instruction of the general electronic line worker lacking in a comprehensive background in electronics

- Service as a refresher course for technicians, lead personnel, and others desiring a fundamental review of blueprint schematic symbols and component practices

- Instruction of employees requiring assistance in the location and identification of typical electronic components used in electronic fabrication work.

TERMINAL BEHAVIOR

Upon completion of the course, the employee was expected to:

- Recognize the more common types of electronic components and understand their basic functions in an electronic circuit

- Identify the more common types of electronic components as represented by the schematic symbols and pictured on assembly and wiring diagrams

- Understand the Standard Parts Manual organization and arrangement and be able to search out part information through the use of the various indexes

- Understand the basic blueprint data and data arrangement, component numbers and quantities, status review data, zones, general notes

- Use the Bench Order as a source of information

- Locate pertinent information on the engineering order as to model dash number, latest change date, description and location of change

- Locate and identify typical electronic components on schematic and assembly type blueprints as required in the performance of electronic fabrication work.

SUBJECT SEQUENCE

The preliminary research steps completed, the programmer sequenced subject matter materials relating to resistors, capacitors, inductors, transformers, switching devices, connectors, diodes, and transistors.

This sequenced material was then broken down into information bits. For example:

Resistors - ohmic value, tolerance, wattage rating and temperature, part number, and code breakdown

Capacitors - value in farads, working voltage, tolerance and types.

This then formed the information bases for the preparation of the step-by-step sequenced script plus storyboard.

PHYSICAL MAKEUP OF COURSE

Electronic blueprint reading, as developed for the course, consists of nine elements:

1-9—Orientation and Resistors
2-9—Capacitors
3-9—Inductors
4-9—Transformers
5-9—Semi-Conductor Family
6-9—Switching Devices
7-9—Connectors
8-9—Standard Parts Manual
9-9—Reading of Blueprints and Engineering Orders.

An integral part of each of the nine elements is a combination of slidefilms and magnetic tapes. As a unit, the slidefilms and tapes guide the trainee into use of integrated review and work exercises. There is a total of 196 slides, with the elements varying from 12 to 36 slides. The tape carries all voice and tone cueing instructions.

SUPPORT MATERIAL, INSTRUCTIONS

A student kit that accompanies the slidefilm tape units includes:

- Achievement tests, a Pre-Survey Form, a Post-Survey Form, and assorted schematic attachments

- Printed reference handouts, including schematic drawings, assembly drawings, capacitance color code charts for 5-dot and 6-dot systems, 10 review exercises, and 10 scrambled answer sheets

- Programmed instruction color code book, "The Color Code for Electrical Resistors." (This book was used because it was already in use and by its use the number of frames in the program was lessened.)

The training package is shipped to the requester, and on opening the carton, the requester finds a list of materials and detailed instruction on operation of the hardware and presentation of the course. The requester is

directed to return three items: the Pre-Survey and Post-Survey Forms, a record of the student hours, and the hardware. All materials in the kit, other than the Pre-Survey and Post-Survey Forms, are retained by the individual trainee.

SUPPORT MATERIAL IN ACTION

Following is an illustration of how the course support material is used by the trainee.

Pre-Survey and Post-Survey Forms

The trainee begins the course by answering the questions on the Pre-Survey Form. This form poses 20 questions designed to ascertain the precourse familiarity of the trainee with the subject. From it, the incoming reference score is obtained, which is later compared with the Post-Survey score.

Twenty-five questions and a schematic drawing make up the Post-Survey Form. These are basically the same questions as on the Pre-Survey Form, but in scrambled format. It actually performs the task required to determine the student's over-all score, and tests his performance to the published terminal behavior.

These two forms are mailed back to the Audio-Visual Programming Unit immediately upon completion. They are graded, assessed and a percentile score is obtained and recorded.

Exercise and Answer Sheets

The exercise sheets are designed to review the information presented in each element. The student corrects his answers from a scrambled answer sheet. In the event of a wrong answer, he is instructed not to continue until he becomes familiar with the correct answer.

In practice it was observed that some requesting managers extracted the scrambled answer sheets from the kits and had their representatives correct the trainees' answers.

Programmed Instruction Color Code Book

After ohms and ohmic values and their designation by color bands on the resistors are explained by the A/V program, the student is directed to

take the programmed instruction book, "The Color Code for Electrical Resistors," from his kit. The trainee learns how to read the color code and the tolerance band in two separate steps. He is advised to study the entire programmed instruction book thoroughly at his convenience when he returns to his work area. Figures 1 and 2 present an example of the book's information, question, and response sequencing.

PROFILE OF ONE ELEMENT

The 36 frames of Element 1 are broken down into five categories: Information, Teaching, Review, Drill, and Direction. This breakdown, with some frames being regarded as serving in two categories, shows: Information, 3 frames; Teaching, 10; Review, 2; Drills, 3; Direction, 1.

Breakdown of the other eight elements is approximately the same—the majority of frames being devoted to teaching.

Orientation and Resistors, Element 1, with 36 slides is of the greatest length of the elements as it includes the orientation for all nine. The early slides of Element 1 are devoted to a description and reminder of the use of symbols in communication between nations and languages—with chemical, medical, and mathematical symbols leading up to the field of electronics. Figure 3 presents an example of a page of an illustrated script for Element 1.

Instruction on the resistor illustrates the resistor's designation on blueprints and explains it function. The resistor's designation on schematic drawings, recognition of resistors by wattage size, numbering of resistors, and types of resistors and their symbols are then presented.

The trainee is then directed back to the kit of instructional material, from which he selects "Review Exercise Number 1" and follows its instructions.

CLIENT REVIEW

The script, storyboard and sample supporting materials were presented to the client as his last opportunity to review interpretation and recommend any last minute changes.

This having been accomplished, the programmer obtained a sign-off by the subject specialist, line foreman, client management, and the Audio-Visual Programming Unit Director.

Although signed off, and ready for production, a quick recheck was made to ascertain legitimate need for the program continued to exist. This

was to make certain neither the population nor its requirements had changed during the research and preparation period. No changes having occurred, implementation of the program was started with production of the program materials. However, before the course, now designated as Electronic Blueprint Reading, Program E-329-AV, was completed a trainee test was conducted.

SAMPLING OF COURSE, REVISIONS

A complete step-by-step presentation of electronic blueprint reading was set up for checkout and verification. Presentation was under typical viewing conditions and was programmed to duplicate the manner in which the course customarily would be given. At random an employee from Inspection, was selected by management as representative of the anticipated course participants.

The student selected was a female employee whose duties were those of a line inspector. With the company for five years, she had a high school education; her knowledge of electronic schematics was sketchy, piece-meal information gained mostly from experience with assembly prints in performing job duties.

PROGRAM VERIFICATION

The trainee operated the program, with the A/V observer commenting only when asked questions.

The trainee's pre-survey score was 42 percent, which was considered high because of her job experience.

Overconfident at the start because she thought she knew the subject, the trainee attempted to "beat" the program and the machine. But, faced with the step-by-step process and feedback requirement, she became amazed at the void in her knowledge. After the early frames, the trainee relaxed and followed the programming as directed.

TRAINEE REACTIONS

Observation by the trainee at the conclusion of the course test was that she found it to be an interesting method of learning. The change from picture and sound instruction to working the review exercises caused apprehension in the beginning, but this apprehension disappeared when she found the exercises were worksheets, not tests.

The A/V observer summarized the student reactions to the testing as: "curiosity mixed with concern, gradually giving way to excited interest, then confidence, and finally satisfaction in knowing accomplishment has taken place."

The student's post-survey score was 74 percent, indicating over-all knowledge increase of 32 percent.

PROGRAM TIME

Actual time spent on the program totaled 4 hours and 16 minutes. Additional time, it was known, would be required under true operating conditions because time not considered in the evaluation test included:

- Preliminary instructions for using program and operating equipment
- Answering specific student questions
- Changing slide cartridge or tape reels
- Coffee breaks and/or personal time
- Make-ready and cleanup activities.

It was estimated the normal length of time required to take the course would be 6 hours. This estimate later proved to be correct.

COURSE REVISION NEEDS

Based on detailed examination of the observer's notes, on the various test and review exercise answers, and on the trainee's comments and reactions, the following program revisions were recommended:

- Improve and clarify art work on four slides; visual information was not complete
- Revise a review exercise question to clarify its intent
- Change narration for one frame that confused trainee by leading her to believe she was to start intensive study of one of the support materials immediately
- Provide more detailed instructions for switching back and forth from the viewing screen to the various media kit items.

These changes were implemented and production plans were completed.

PRODUCTION

The production process proceeded normally, with the exception of one problem encountered in the photo process. The course material presented visuals of component parts for identification purposes. In the case of resistors, for example, the exact color code spectrum had to be reproduced on the viewing screen. The first 35mm slides that were produced did not reproduce the true colors required, and a detailed investigation was launched into the problem.

After a series of color balance and color temperature tests were conducted, it was determined that the original art work material used to represent the resistor color codings was of an inferior material. A combination of loose tolerances in lighting, camera work, and processing caused the original colors to become diffused and distorted when reproduced on 35mm slides.

This condition was corrected in the original art work by use of a higher quality grade of materials, and the detailing of exact quality standards for the photo laboratory.

PROCEDURES FOR DISPENSING COURSE

Availability of the electronic blueprint reading course was publicized in the Division's training monthly bulletin and through spot announcements on closed-circuit television. Requests were filled on the basis of the date requested and the size of population of the requesting department. Inplant shipping hand carried packages to the requester from the Audio-Visual Programming Unit.

COMPLETED COURSE PRESENTATION

Employees of Procurement Quality Control Planning and Manufacturing Test and Inspection were among the first of the population to take the completed course.

Under management's direction, line supervisors and foremen selected employees to participate in the program. When the individual management stipulated that the training would be conducted in small groups, a department training coordinator was designated to take charge of the program.

In cases where individuals who were between jobs or subject to "down" time, the audio-visual training program was introduced under the direct control of a line supervisor.

The basic program instructions called for the student to correct his own work. There were times, however, when, at the discretion of management, the scrambled answer sheets were extracted from the kits prior to delivery to the individual students.

The completed answer sheets were collected by the training coordinator, corrected, reviewed to ascertain if a student had to repeat a module, and then returned to the student. No records were kept of individual scores by the department coordinators.

Programs were presented in a variety of locations, and at widely varying times during the first- and second-shift work periods.

A typical group presentation was described by one department coordinator: "The trainees were seated at tables forming a U. Sessions were an hour and a half in length—elements being shown separately—in order that employees not remain away from their duties too long at any one time.

This presentation was conducted in a conference room in the department area. Three groups—numbering nine, six, and five employees—participated at different time periods.

PRE- AND POST-SURVEY SCORES

The scores of the first six groups were evaluated and it was determined the over-all percentage gained by the students was high enough to indicate the program would be successful.

The over-all gain of the six groups was 40. 9 percent. Individual scores ranged from a minus 8 percent to a plus ~~477~~ 274 percent.

Several minus scores appeared, and a comparison of the pre- and post-papers, and a check with their supervisors, indicated that in all cases the minus scoring students had a high pre-score, were bored with the idea of having to take a basic course, and were in general extremely careless in composing their post survey answers.

As one supervisor stated: "Some of my people are extremely knowledgeable and therefore become easily confused; they are reading more into a question than appears on the surface."

The scores of the first six groups follow.

Pre and Post Sample Scores:

Group 1

Pre-Score	Post-Score	Percentage Gain
19	71	+~~477~~ 274 67
52	87	+~~35~~
65	69	+06
68	82	+20
69	98	+42
69	78	+13
72	74	+03
82	77	-05
84	95	+13
84	82	-02
85	95	+10
91	87	-04
93	85	-08
94	87	-07
98	100	+02
	Group Average	~~+40. 4~~ 28. 3

Group 2

Pre-Score	Post-Score	Percentage Gain
43	94	+119
55	96	+75
58	83	+43
64	99	+55
69	92	+33
84	98	+17
88	94	+07
	Group Average	+49. 8

Group 3

Pre-Score	Post-Score	Percentage Gain
47	90	+91
58	76	+31
61	94	+54
62	75	+21
69	94	+36
67	79	+18
77	94	+22
78	95	+22
81	96	+19
	Group Average	+35

Group 4

Pre-Score	Post-Score	Percentage Gain
42	90	+114
43	90	+109
61	92	+51
63	91	+44
63	93	+48
63	86	+37
72	93	+29
76	96	+26
77	93	+21
	Group Average	+53

Group 5

Pre-Score	Post-Score	Percentage Gain
53	68	+28
55	88	+60
72	91	+26
74	98	+32
75	98	+31
80	92	+15
	Group Average	+32

Group 6

Pre-Score	Post-Score	Percentage Gain
38	50	+32
66	90	+24
89	93	+45
	Group Average	+35

SCORING VALIDITY

The concept of remote testing has a need for extensive research before we can fully claim valid remote scores, for one may argue with the validity of the post scores plus the indicated percentages gained by the students.

Certainly the pre- and post-surveys were not totally administered under controlled situations. Even the construction of the surveys themselves may be open to attack, and the logic of the mathematical formula may be taken as an issue, but no one can argue with the enthusiasm generated by the students and management alike after having completed the modular A/V multimedia programming course. A follow-up questionnaire plus selected interviews tends to illustrate this point.

REACTION BY MANAGEMENT

One member of management sat in on a portion of the sessions. His reaction was one of enthusiasm for the course and the concept. "If we did not have this," he said, "these men would not receive this type training. We cannot break away any large numbers of inspectors from the immediate work area for any long period of time."

He added that the audio-visual program provides an informal, relaxed atmosphere, and it "sharpens the oldtimers and brings the newer employees up to department standards." Also noted was that the course pointed out that some techniques, seldom used, had been forgotten by the veteran employees.

Another member of management reported that the students returned to their work assignments with a greater feeling of confidence in themselves, having mastered a training situation, while enjoying themselves. For many it was the first such positive experience in training since leaving high school.

EVALUATION SURVEY

Upon completion of the Electronic Blueprint reading program a follow-up evaluation survey sheet was sent to each participating student and his management. Thirteen questions were presented in order to obtain data on program usage, and student reactions to program concepts.

Analysis showed that management responses were more objective, while the students tended to be subjective.

Answers and reactions follow.

MANAGEMENT RESPONSES

To the question, in what way has participation in the A/V program, Electronic Blueprint Reading, helped your employees, Management responded with these comments:

- "Helps give all employees an over-all picture of the departmental tasks; these men deal with individual parts and often are unable to relate to a finished item."
- "Teaches more effective use of "tools" in order that management can save money and time."
- "Prepares personnel for one way of job thinking; standardizes inspection to company procedures."
- "Motivates for better attitude on the job by adding to the individual's knowledge and increasing his confidence."

STUDENT RESPONSES

Answers and reactions by students to questions posed through the survey are reported in part here.

Question:

What impressed you the most about this program and the method of presentation?

Responses:

- "The course illustrated the basics of electronics with clear visual aids, and gave the individual time to think about the subject presented before going on to a new one. It put the course on the honor system, where, if you cheat—you cheat yourself."
- "The simplicity and methods used to put across a point"
- "Presented in detail so you couldn't possibly misunderstand"
- "You need no instructor and are able to concentrate more on details"
- "Well planned kit and clear instructions"
- "Clear presentation, sticking with fundamentals"
- "Clarity in layout (visual portion) and explanation of details while viewing pictures"
- "Uncluttered presentation"
- "The slides being in color... the narrator speaking clearly and having a pleasing voice... the fact that if you did not understand the first time of being able to stop the machine and go back until you did understand it"
- "The idea of taking an examination immediately after presentation, while the subject matter is still fresh in mind"
- "We were shown and told at the same time; this made for a deeper impression"
- "It was thorough and well programmed"
- "I liked the way it was presented... after finishing the test and what questions I had not correct or in doubt was able to review and therefore was very much to my advantage"
- "The fact that the company will take the time to go to the expense to present the class; I hope they continue to do so."

Negative Views

Question:

What would you recommend we do to improve the program, method of presentation, or support materials? (This series of answers provided clues about our students and program presentation handling).

Responses:

- "Nothing, except that it introduced new electronic symbols which confused the average electronic enthusiast with many years experience."
- "I would recommend that the course be given to employees with little or no experience in electronics (since it is a basic electronics course) and not to employees who have had extensive education and experience in electronics."
- "It was given too quickly. Not enough time for discussion. There is more than one possible answer to some of the questions and the instructor stuck to the one given in class with no deviation."
- "Too much to absorb in the time given—it would be necessary to see film several times in order to familiarize ones self with unknown subjects or parts shown, such as complex capacitor reading of values."
- "Make the tests multiple choice as there was some confusion during correction of tests because similar, but not exact, wording was used."
- "Take a little more time on some of the more technical subjects."
- "Have a quiet room, where there would not be any disturbance."

Observation

From these reactions we concluded that:

- In some areas where a department assigned a coordinator to administer the program to a group, the coordinator did not wait for the group to demand the next frame, but set his own pace in presentation, which must have been too fast for many of the students.

- Several of the students who believed themselves to be "over developed" in the subject area, and in fact, pulled a minus score in their post-survey, chose the improvement of program question as a means of expressing their resentment for being assigned to participate in the program.

Positive Views

In contrast to the negative reactions, the question on improving the program also produced these positive responses:

- "I feel that we need additional programs and that classes should be held more frequently."
- "In order to retain the information learned, the course should be repeated periodically."
- "Make packages more readily available"
- "Nothing—should be excellent for people who know nothing of subject."
- "More schematic reading"
- "Improve support materials"
- "I believe this course was the most outstanding one I've participated in while at S&ID.[1] My only suggestion is to promote more training courses of this quality and educational value."

Responses Percentaged

The balance of the questions are now presented with the responses indicated in percentages.

Question:

Describe the physical area where you received your A/V training.

Response:

Office	22%
Conference room	74%
Work station	4%

[1]Space and Information Systems Division of North American Aviation, Inc.

Question:

During what period of the day did you use the A/V program?

Response:

Between:

7:30 am - 11:30 am	82%
12:00 pm - 2:00 pm	4%
2:00 pm - 5:00 pm	14%

Question:

Did you view the A/V machine alone?

Response:

Yes - 22%

With others? - 78%
(Viewed in groups ranging from two to twenty individuals.)

Question?

Did you correct your own exercises and reviews?

Response:

Yes - 68%
No - 32%

Question?

Did participation in this program contribute to your knowledge of the subject?

Response:

Yes - 96%
No - 4%

Question?

Will the information gained by of value to you in fulfilling your present or future assignments?

Response:

Considerably - 58%
Some - 24%
Little - 14%
None - 4%

Question:

Would you be interested in receiving more training by this method?

Response:

Yes - 88%
No - 12%

(Those who responded "yes" requested additional A/V training in the areas of: Electronics, Technical Administration Procedures, and an assortment of manufacturing related job assignments.)

Question:

How would you rate this program?

Response:

Excellent - 28%
Good - 54%
Fair - 16%
Poor - 2%

Question:

Have you ever participated in A/V training programs using any of the following media?

Response:

Programmed instruction books	22%
Teaching machines	12%
Slide/strip films	38%
Motion pictures, closed circuit TV and misc.	28%

Question:

Are you now taking any schooling or training?

Response:

High school (night) - 0
Junior College - 14%
University - 4%
Correspondence - 8%
NAA Company Training - 8%
None - 66%

SUMMARY

It is interesting to note that 66 percent of the population using the program had no formal schooling involvement since leaving high school. Members of this group indicated they were motivated by participation in the Modular A/V Multimedia Program, had a good feeling about learning something new, were ready to seek out more training situations, and were responding to their daily jobs with increased enthusiasm.

In consideration of the responses from students who appreciated the relaxed atmosphere of an automated systems as opposed to the pressure of a typical classroom situation, we find students to be more receptive to knowledge through A/V programming. Under these favorable conditions, the wall of suspicions, fears, and old prejudices can be eliminated for the students and replaced with a series of new acceptable predirected attitudes.

The experience and data gained in the development and implementation of this exercise has provided a greater insight into a nascent answer to the problems of mass training through automated systems.

The analysis of this project confirms that intensive and complex training can be successfully implemented with a remote automated A/V system that is not dependent on a centralized classroom center.

We now have physical evidence that the multimedia concept when applied in an automated system is both realistic and manageable.

We have further determined that the concept of modular A/V programming is an effective vehicle to effect a conditioning situation between management and employee alike—one through which a discipline of instruction can be provided to a receptive audience.

There exists a need to improve the total concept in form and application. Variables in presentation of an automated system and program, and their effects on the program outcome and student learning attitudes, form a typical area requiring extensive research and development.

For the present, with knowledge we now have, we know that the concept does work. It is a realistic vehicle to bring training to an employee at his work site. It is being received most favorably by the management and student population.

We therefore present this report as evidence of the effectiveness of Modular A/V Programming as a part of a multimedia instructional automated system.

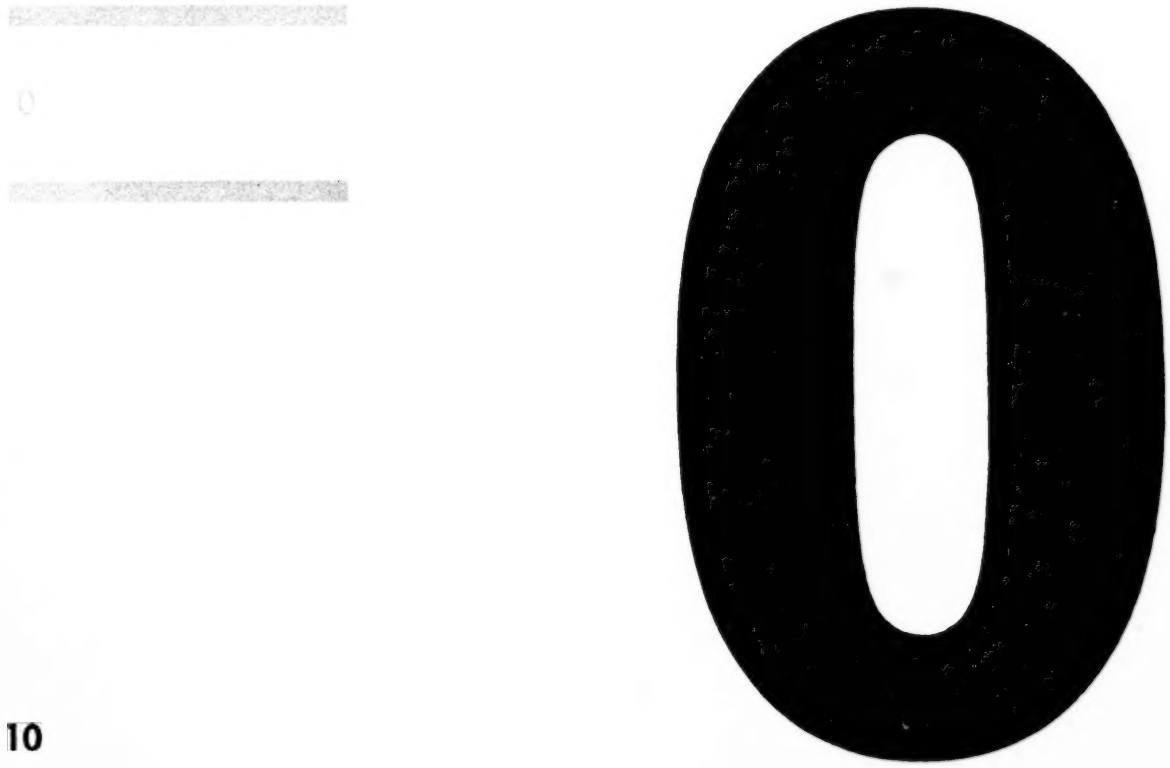
Black ([redacted]) means zero (0).

In this code, when you see [redacted], think of zero

and write the number _____.

9

Figure 1. Typical Information and Question (Right-Hand) Page in Programmed Instruction Book



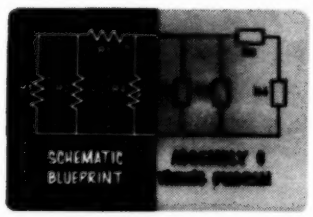
10

Figure 2. Left-Hand or Reverse Side of Page Above With Response and Reinforcement

Element Number and Title: Element 1-9 "Orientation and Resistors"

Let's begin the study of electronic symbols with the familiar resistor. This is what a fixed resistor looks like! It is designated on blueprints by the letter R. Its function is to offer resistance or reduce the flow of current in a circuit.

A resistor is designated on schematic drawings as a jagged line. On assembly and wiring diagrams it will be recognized from the letter R plainly visible on the symbol.



If there is more than one resistor shown on the blueprint, the symbols will be numbered in sequence. This makes identification much easier!

Wattage is the amount or capacity of current that a resistor can handle safely without burning out. The larger the physical size of the resistor, the greater the wattage! Study the comparative sizes of these resistors. You should be able to identify these three common wattage sizes! Resistors rated at 5 watts and over will usually be marked!

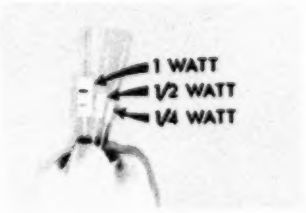


Figure 3. Example of Page of Script With Slides Illustrated